

AMENDMENTS TO THE CLAIMS

This listing of claims will replace all prior versions and listings of claims in the application.

COMPLETE LISTING OF CLAIMS:

Claims 1-44 : (Canceled)

Claim 45 : (New) A data communications system, comprising:

- a) a plurality of nodes and a plurality of links for providing connections between the nodes;
- b) a subset of the links and the nodes being operative for forming a worker path for carrying worker data through the communications system;
- c) a further subset of the links and the nodes being operative for forming a plurality of protection paths for carrying non-worker data in the absence of a fault in the worker path, and each being operative for providing an alternative path for the worker data in a different part of the worker path in the event of the fault in the worker path; and
- d) protection means, in which the alternative paths are predetermined by the protection means prior to detection of the fault in the worker path, the protection means being operative for activating the entire plurality of protection paths to carry the worker data upon detection of the fault in the worker path, and the protection means being further operative for identifying the location of the fault, for returning the worker data to those parts of the worker path not affected by the fault, and for de-activating any of the protection paths providing an alternative to those parts of the worker path not affected by the fault.

Claim 46 : (New) The system according to claim 45, in which the nodes of the further subset comprise storage for storing details of the protection paths prior to the detection of the fault in the worker path.

Claim 47 : (New) The system according to claim 46, in which the details of the protection path are associated with a unique path identifier.

Claim 48 : (New) The system according to claim 46, in which each of the nodes of the further subset comprise a protection table for storing the details of the protection path to which it belongs.

Claim 49 : (New) The system according to claim 45, in which at least one of the nodes common to both subsets comprises means for detecting the fault in the worker path, and means for activating the protection paths by sending an activate message to the nodes of the further subset upon detection of the fault in the worker path.

Claim 50 : (New) The system according to claim 49, in which the nodes comprising means for sending the activate message also comprise means for sending the activate message to each adjacent node of the further subset.

Claim 51 : (New) The system according to claim 49, in which the activate message contains a unique path identifier to inform the nodes of the further subset which connections to activate.

Claim 52 : (New) The system according to claim 45, in which the nodes comprise means for detecting the location of the fault in the worker path and means for, upon detection of the fault location, sending a deactivate message through the first-mentioned subset in a direction away from the fault.

Claim 53 : (New) The system according to claim 52, in which each node comprises means for detecting receipt of the deactivate message and, upon receipt of such a message, for deactivating any path passing from that node via nodes of the further subset where those paths do not form a protection path to a faulty part of the worker path.

Claim 54 : (New) The system according to claim 45, comprising means for allocating the links and the nodes at least one cost value relative to the links and the nodes of the worker path, and means for selecting on the basis of the at least one cost value a further subset of the nodes and the links to form a protection path for at least one of the links and the nodes of the worker path.

Claim 55 : (New) The system according to claim 54, comprising means for selecting the subset that has the lowest cost value.

Claim 56 : (New) The system according to claim 55, comprising means for allocating the nodes and the links on the worker path other than the at least one of the nodes and the links to be protected a cost value lower than the cost value for other nodes and links.

Claim 57 : (New) The system according to claim 56, in which the lower cost value is zero.

Claim 58 : (New) The system according to claim 54, comprising means for allocating the at least one of the nodes and the links to be protected a cost value higher than the cost value for other nodes and links.

Claim 59 : (New) The system according to claim 54, in which a cost value for the at least one of the nodes and the links to be protected is set so that the at least one of the nodes and the links will not be selected.

Claim 60 : (New) The system according to claim 54, comprising further subsets of the nodes and links for forming both a further worker path and a protection path for the further worker path.

Claim 61 : (New) The system according to claim 60, comprising means for allocating to at least one of a node and a link at least one intermediate cost value relative to each link and node of the worker path, provided that the at least one of the links and the nodes in the worker path and the links and nodes in the further worker path protected by the at least one of the nodes and the links have no common point of failure.

Claim 62 : (New) The system according to claim 61, in which the intermediate value lies between the higher and lower values.

Claim 63 : (New) The system according to claim 62, comprising means for allocating to at least one of a node and a link at least one higher cost value relative to the at least one of the links and the nodes of the worker path so that the at least one of the nodes and the links will not be selected, and wherein the links and the nodes in the worker path and the links or nodes in the further worker path protected by the node or link have a common point of failure.

Claim 64 : (New) The system according to claim 54, including means for allocating the links and the nodes a cost value relative to each link and node of the worker path.

Claim 65 : (New) The system according to claim 54, in which the system comprises protection means for determining the protection path prior to the detection of the fault in the worker path.

Claim 66 : (New) The system according to claim 59, comprising means for allocating the links and the nodes a further cost value relative to the further worker path and for

selecting on the basis of the further cost value a further subset of the nodes and links to form the protection path for at least one of the links and the nodes of the further worker path.

Claim 67 : (New) A method of protecting a worker path in a data communications system, comprising the steps of:

a) providing a plurality of nodes and a plurality of links for providing connections between the nodes;

b) passing worker data through a subset of the links and the nodes making up the worker path, and designating a further subset of the links and the nodes to form a plurality of protection paths;

c) the protection paths carrying no worker data in the absence of the fault in the worker path, and each providing an alternative path for the worker data in a different part of the worker path in the event of the fault in the worker path;

d) detecting the fault in the worker path, and activating the entire plurality of protection paths to carry the worker data upon detection of the fault in the worker path;

e) identifying a location of the fault, and returning the worker data to those parts of the worker path not affected by the fault; and

f) deactivating any of the protection paths that are providing an alternative for those parts of the worker path not affected by the fault.

Claim 68 : (New) The method according to claim 67, including the step of storing details of the protection paths in the nodes of the further subset prior to the detection of the fault in the worker path.

Claim 69 : (New) The method according to claim 68, including the step of associating the details of the protection path with a unique path identifier.

Claim 70 : (New) The method according to claim 68, in which each of the nodes of the further subset comprise a protection table for storing details of the protection path of which it forms a part.

Claim 71 : (New) The method according to claim 67, including the steps of at least one of the nodes common to both subsets detecting the fault in the worker path, and activating the protection paths by sending an activate message to the nodes of the further subset upon detection of the fault in the worker path.

Claim 72 : (New) The method according to claim 71, including the step of operating the nodes to send the activate message to each adjacent node of the further subset.

Claim 73 : (New) The method according to claim 71, including the step of including a unique path identifier in the activate message to inform the nodes of the further subset which connections to activate.

Claim 74 : (New) The method according to claim 67, including the steps of at least one node detecting a location of the fault in the worker path and, upon detection of the fault location, sending a deactivate message through the first-mentioned subset in a direction away from the fault.

Claim 75 : (New) The method according to claim 74, including the steps of the nodes detecting receipt of the deactivate message and, upon receipt of the deactivate message, deactivating any path passing from the node via nodes of the further subset where those paths do not form a protection path to a faulty part of the worker path.

Claim 76 : (New) The method according to claim 67, including the steps of allocating the links and the nodes at least one cost value relative to the links and the nodes of the worker path, and selecting on the basis of the at least one cost value a further subset of the nodes and the links to form a protection path for at least one of the links and the node of the worker path.

Claim 77 : (New) The method according to claim 76, including the steps of selecting the subset that has the lowest cost value.

Claim 78 : (New) The method according to claim 76, including the steps of setting the at least one cost value for the nodes and the links on the worker path other than the at least one of the nodes and the links to be protected lower than the cost value for other of the nodes and the links.

Claim 79 : (New) The method according to claim 78, in which the lower cost value is zero.

Claim 80 : (New) The method according to claim 76, including the steps of setting the at least one cost value for the at least one of the nodes and the links to be protected higher than the cost values for other of the nodes and the links.

Claim 81 : (New) The method according to claim 76, including the steps of setting the at least one cost value for the at least one of the nodes and the links to be protected so that the at least one of the nodes and the links will not be selected.

Claim 82 : (New) The method according to claim 76, and comprising a further worker path for protection for the further worker path in the data communications system.

Claim 83 : (New) The method according to claim 82, including the steps of setting the at least one cost value relative to the worker path of one of a node and a link to an

intermediate value, provided that the nodes and/or links on the worker path and on the further worker path for protection by the one of the node and the link have no common point of failure.

Claim 84 : (New) The method according to claim 83, in which the intermediate value lies between the higher and lower values.

Claim 85 : (New) The method according to claim 84, including the steps of setting the at least one cost value relative to the worker path of one of a node and a link to a higher value so that the one of the node and the link will not be selected, if the nodes and/or links on the worker path and on the further worker path for protection by the one of the node and the link have at least one common point of failure.

Claim 86 : (New) The method according to claim 76, including the step of allocating each link and node at least one cost value relative to each link and node of the worker path.

Claim 87 : (New) The method according to claim 86, including the step of determining the protection path prior to the detection of the fault in the worker path.

Claim 88 : (New) The method according to claim 87, including the steps of allocating the links and nodes a further cost value relative to the further worker path, and selecting on the basis of the further cost value a further subset of the nodes and links to form the protection path for at least one of the links and the nodes of the further worker path.